Generalized electrodynamics based on ternary non-linear algebraic structures

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We re-formulate the relativistic electrodynamics taking into account internal degrees of freedom of the charged relativistic dynamics. The discovery of internal structure of the relativistic dynamics and its connection with three-order phase space formalism (see, [1], [2]) opens new insights to extend the frames of the classical dynamics on the whole. Based on this formulation of the relativistic electrodynamics we build new dynamics based on ternary algebraic structures. The internal and external degrees of freedom of the charged particle obeying such a dynamics are described by Jacobi and Weierstrass elliptic functions, correspondingly. Within the new dynamics analogues of Hamilton-Jacobi equations are derived, and the analogues of Klein-Gordon and Maxwell equations are constructed.

References

[1] Nambu, Y.. *Physical Review*, **D7**(2405), 1973.

[2] Yamaleev, R.M.. *Annals of Physics*, **292**(157-178), 2001.